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Critical minerals: from production to resilient value chains

By

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Critical minerals: from production to resilient value chains

Isabelle Ramdoo
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Critical minerals and resilient value chains

What is driving the demand for critical minerals?

Leveraging opportunities to build resilient supply chains (a focus on Africa)
- Overview of Africa’s critical minerals sector
- The Energy Quadrilemma
- Building domestic and regional supply chains
- Becoming a global supplier of choice

Way forward: Four key priorities
1. What is driving demand for critical minerals?

Demand for critical minerals is set to grow over the next two decades as the world pursues net zero goals; overall requirements rise by as much as 4 times, but individual minerals (lithium to rise even faster)

**Notes:** STEPS = Stated Policies Scenarios; APS = Announced Pledges Scenario; NZE = Net Zero Emissions by 2050 Scenario. Includes most of the minerals used in various clean energy technologies, but does not include steel and aluminium.

**Source:** IEA, 2022
2. Global supply of key critical minerals and metals

The pie charts show the percent distribution of the production of critical metals and minerals. In total, it is 100% for each raw material. The area of the pies are proportional. SGU 2017.
2. Critical Mineral Overview (developing countries)

Share of African production compared to global production

Source: S&P Global, 2021
3. High production but limited transformation

African share of global mineral production (2019)

Growth in production: 2010 - 19

<table>
<thead>
<tr>
<th>% growth (2010-19)</th>
<th>Cobalt</th>
<th>Copper</th>
<th>Graphite</th>
<th>Lithium</th>
<th>Manganese</th>
<th>Nickel</th>
<th>Platinum</th>
<th>Palladium</th>
<th>Rhodium</th>
<th>REEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>-6.2%</td>
<td>81.0%</td>
<td><strong>4508%</strong></td>
<td>49.2%</td>
<td><strong>121.5%</strong></td>
<td>40.9%</td>
<td>-4.2%</td>
<td>0.7%</td>
<td>1.9%</td>
<td>Negligible</td>
</tr>
<tr>
<td>Rest of World</td>
<td>27.5%</td>
<td>23.5%</td>
<td>-7.7%</td>
<td>248.9%</td>
<td>-10.9%</td>
<td>69.9%</td>
<td>10.6%</td>
<td>25.6%</td>
<td>17.2%</td>
<td>66.8%</td>
</tr>
</tbody>
</table>

Source: World-mining-data
Demand will not slow down in the future and downstream industries will follow midstream ones

Share of top 3 processing countries in processing of CRM (2019)

No. of lithium-ion gigafactories in the pipeline, where China dominates the market.

Source: (IEA, 2021)

Source: Benchmark Lithium-ion Gigafactory Assessment (2021)
4. Biggest challenge: Africa’s energy quadrilemma

01. Securing universal access to energy
02. Ensuring stable and reliable energy supply
03. Ensuring affordable costs of energy
04. Minimizing negative environmental externalities linked to climate change
5. Building resilient domestic value chains: Not a choice, an imperative

Building domestic value chains is key to create industries, value and jobs in Africa

Diversification imperative:
- Upstream opportunities to supply mining operations
- Mid and downstream opportunities for higher value-added products

Energy justice necessity:
African CRMs should be used as inputs to develop its own energy solutions to address its quadrilemma

Sustainability responsibility
Local supply chains have a lower carbon footprint
6. Regional and continental value chains are critical

- Countries won’t do it alone, regional cooperation is key
- Need to identify strategic sectors to build industrial capacity: Existing plans for renewable energy and automotive sector
- Regional initiatives under way: DRC – Zambia SEZ for battery precursors; automotive VC in Morocco; Hydrogen Fuel cells in South Africa
- Regional and Continental strategies will facilitate the process: Africa Green Minerals Strategy must be domesticated
- Regional and continental instruments must be leveraged: Regional FTAs; ACFTA

<table>
<thead>
<tr>
<th>Mineral</th>
<th>End-use</th>
<th>Selected African producers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>Battery chemistries</td>
<td>DRC, Zambia, Morocco, Madagascar</td>
</tr>
<tr>
<td>Copper</td>
<td>All industries, incl. construction, automotive, renewables, digital technologies</td>
<td>DRC, Zambia, many others</td>
</tr>
<tr>
<td>Graphite</td>
<td>Battery chemistries</td>
<td>Mozambique, Madagascar</td>
</tr>
<tr>
<td>Lithium</td>
<td>Battery chemistries</td>
<td>Zimbabwe, Namibia, DRC, Ghana</td>
</tr>
<tr>
<td>Manganese</td>
<td>Iron and steel-making, battery chemistries</td>
<td>South Africa, Gabon, Ghana</td>
</tr>
<tr>
<td>Nickel</td>
<td>Iron and steel-making, battery chemistries</td>
<td>South Africa, Madagascar</td>
</tr>
<tr>
<td>PGMs</td>
<td>Catalytic converters, fuel cells</td>
<td>South Africa, Zimbabwe</td>
</tr>
<tr>
<td>REEs</td>
<td>Permanent magnets for wind turbines and electric motors</td>
<td>Burundi</td>
</tr>
</tbody>
</table>

Source: S&P Global, 2021
7. Africa must position itself as a supplier of choice at the global level

1. A geostrategic priority to provide choice to the market
2. An opportunity to become a partner of choice
3. An opportunity to build domestic and regional priorities with perspectives of securing global markets
4. An opportunity to drive climate change actions at global level
Conclusions

The moment is NOW
Substantial efforts being made to address risks and bottlenecks in supply chains

Window of opportunity is small and narrowing
Demand will not fall, but attention on ‘critical’ minerals may wane as solutions to risks are found
THANK YOU

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